# RAMAPO-INDIAN HILLS SCHOOL DISTRICT

Dear Ramapo-Indian Hills Student:

Please find attached the summer packet for your upcoming math course. The purpose of the summer packet is to provide you with an opportunity to review prerequisite skills and concepts in preparation for your next year's mathematics course. While you may find some problems in this packet to be easy, you may also find others to be more difficult; therefore, you are not necessarily expected to answer every question correctly. Rather, the expectation is for students to put forth their best effort, and work diligently through each problem.

To that end, you may wish to review notes from prior courses or on-line videos (www.KhanAcademy.com, www.glencoe.com, www.youtube.com) to refresh your memory on how to complete these problems. We recommend you circle any problems that cause you difficulty, and ask your teachers to review the respective questions when you return to school in September. Again, given that math builds on prior concepts, the purpose of this packet is to help prepare you for your upcoming math course by reviewing these prerequisite skills; therefore, the greater effort you put forth on this packet, the greater it will benefit you when you return to school.

Please bring your packet and completed work to the first day of class in September. Teachers will plan to review concepts from the summer packets in class and will also be available to answer questions during their extra help hours after school. Teachers may assess on the material in these summer packets after reviewing with the class.

If there are any questions, please do not hesitate to contact the Math Supervisors at the numbers noted below.

Enjoy your summer!

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# Ramapo- Indian Hills High School
# Summer Math Packet

## Geometry CPE

To the students:
The following set of review problems were designed to prepare you for your Geometry CP/CPE course. You can either print out the problems or complete them on a separate piece of paper. Please bring the packet and your completed work at the beginning of the new school year.

Thank you.

## Section 0.4: Algebraic Expressions

**PEMDAS** – the order in which you evaluate expressions
**P – Parenthesis**
**E – Exponents**
**M – Multiplication (from left**
**D – Division to right)**
**A – Addition (from left**
**S – Substraction to right)**

Evaluate each expression if $a = 2, b = -3, c = -1$, and $d = 4$.

**1.)** $2a + c$

**2.)** $\frac{bd}{2c}$

**3.)** $\frac{2d-a}{b}$

**4.)** $\frac{3b}{5a+c}$

**5.)** $(c+b)^2$

**6.)** $c + b^2$

## Section 0.5: Linear Equations

**Example:** Solve the equation.

$$\frac{2}{3}n + 1 = 11$$

| | |
|---|---|
| $\frac{2}{3}n + 1 = 11$<br>$\underline{\quad -1 \quad -1}$ | Subtract 1 from each side. |
| $(3)\frac{2}{3}n = 10(3)$ | Multiply each side by 3. |
| $\frac{2n}{2} = \frac{30}{2}$ | Divide each side by 2. |

Solve each equation.

**7.)** $r + 11 = 3$

**8.)** $\frac{8}{5}a = -6$

**9.)** $\frac{m}{10} + 15 = 21$

**10.)** $9n + 4 = 5n + 18$

**11.)** $-2y + 17 = -13$

**12.)** $-2(n + 7) = 15$

## Section 0.7: Ordered Pairs

**Important Notes:**

- Points in the coordinate plane are known as **ordered pairs**.
- Ordered pairs are written in the form $(x, y)$.
- The x-axis and y-axis divide the coordinate plane into four quadrants.
- The point of intersection of the axes is the **origin**.
- The origin is located at $(0,0)$.

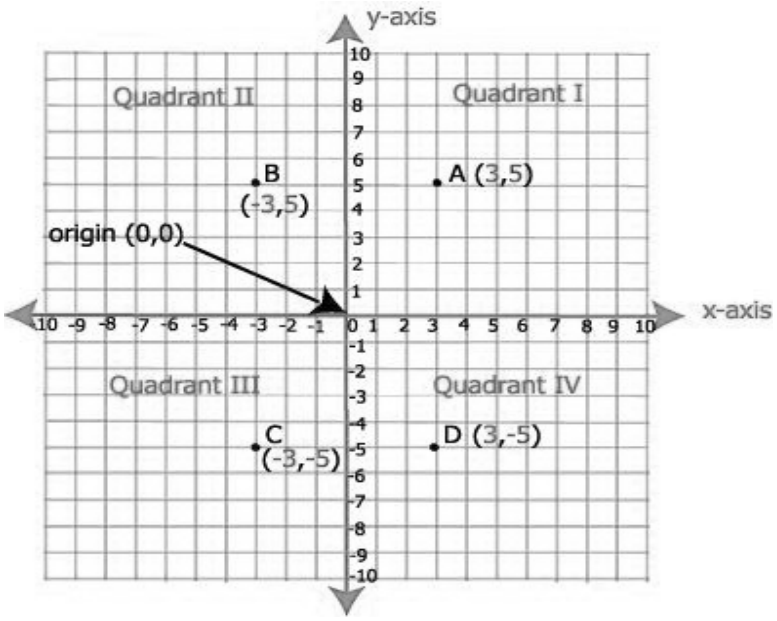
**Example:**

$A\ (3,5)$ - Quadrant I

$B(-3,6)$ - Quadrant II

$C(-3,-5)$ - Quadrant III

$D(3,-5)$ - Quadrant IV




**Write the ordered pair for each point shown in the coordinate plane.**

**13.)** B = (  ,  )

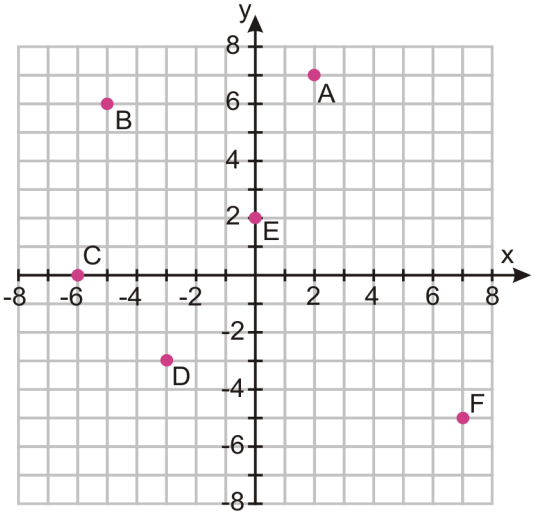
**14.)** C = (  ,  )

**15.)** E = (  ,  )

**16.)** A = (  ,  )

**17.)** D = (  ,  )

**18.)** F = (  ,  )

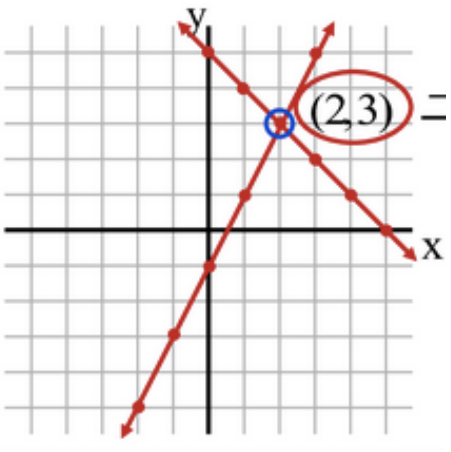


## Section 0.8: Systems of Linear Equations

### Solving Systems by Graphing

**Example:** Solve the system of equations by graphing.

$$y = 2x - 1$$
$$x + y = 5$$




Step 1: Graph each line. The second equation here needs to be changed to $y = mx + b$.

$$\begin{array}{l} x + y = 5 \\ -x \quad\quad -x \\ y = -x + 5 \end{array}$$

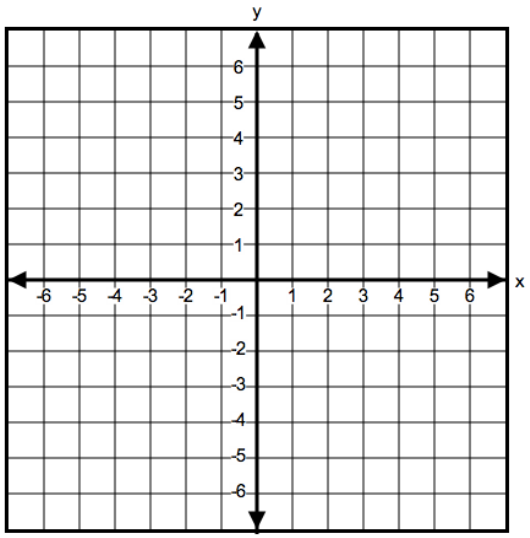
Step 2: Find the point of intersection.
If the lines overlap – infinitely many solutions
If lines are parallel – no solution

Solution: $(2, 3)$

Solve by graphing.

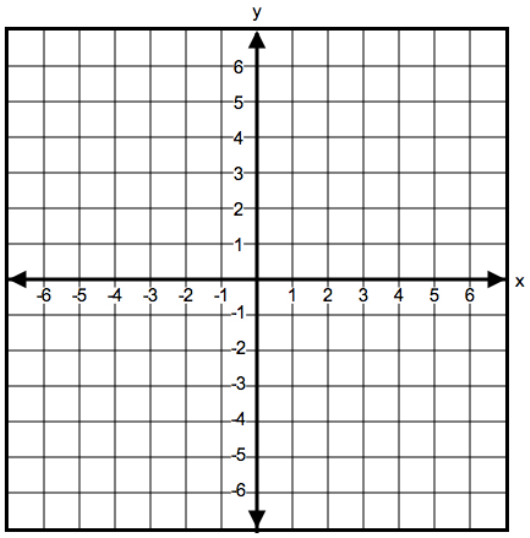
**19.)** $y = -x + 2$

$y = -\frac{1}{2}x + 1$




**20.)** $y - 2x = 1$

$2y - 4x = 1$



## Solving Systems by Substitution

**Example:** Solve the system of equations by substitution.

$y - 3x = -3$
$-2x - 4y = 26$

Step 1: Solve for a variable for either equation. (It is ideal to pick the variable with a coefficient of 1)
$y - 3x = -3$
$+3x \quad +3x$
$y = 3x - 3$

Step 2: Plug the expression $3x - 3$ in for $y$ of the OTHER equation.
$-2x - 4y = 26$
$-2x - 4(3x - 3) = 26$

Step 3: Solve for $x$.
$-2x - 4(3x - 3) = 26$
$-2x - 12x + 12 = 26$
$-14x + 12 = 26$
$-14x = 14$
$x = -1$

Step 4: Plug in x for either equation to solve for y.
$y = 3x - 3$
$y = 3(-1) - 3$
$y = -6$

Final Solution: $(-1, -6)$

Solve by substitution.

**21.)** $-5x + 3y = 12$
$x + 2y = 8$

**22.)** $x - 4y = 22$
$2x + 5y = -21$

## Solving Systems by Elimination

**Example:** Solve the system of equations by elimination.

$4x - 3y = 25$
$-3x + 8y = 10$

Step 1: Decide which variable you want to eliminate and find the LCM of the two coefficients for that variable.

Eliminate $x$ → 4 and -3 have an LCM of 12

Step 2: Multiply each equation by the number that will make the x-terms have a coefficient of 12. One must be negative and the other must be positive.

$3(4x - 3y = 25)$ → $12x - 9y = 75$
$4(-3x + 8y = 10)$ $\quad -12x + 32y = 40$

Step 3: Add the columns of like terms.

$$\begin{array}{r} 12x - 9y = 75 \\ \underline{-12x + 32y = 40} \\ 23y = 115 \\ y = 5 \end{array}$$

Step 4: Plug in $y$ for either equation to solve for $x$.

$4x - 3y = 25$
$4x - 3(5) = 25$
$x = 10$

Final Solution: $(10, 5)$

Solve by elimination.

**23.)** $-3x + y = 7$
$3x + 2y = 2$

**24.)** $-4x + 5y = -11$
$2x + 3y = 11$

## 0.9: Square Roots and Simplifying Radicals

- **Product Property** for two numbers, $a, b \geq 0$, $\sqrt{ab} = \sqrt{a} \cdot \sqrt{b}$
- **Quotient Property** for any numbers *a* and *b*, where $a, b \geq 0$, $\sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}}$

**Ex. 1 Simplify** $\sqrt{45} = \sqrt{9 \cdot 5} = \sqrt{3 \cdot 3 \cdot 5} = 3\sqrt{5}$

**Ex.2 Simplify** $\sqrt{\frac{25}{16}} = \frac{\sqrt{25}}{\sqrt{16}} = \frac{5}{4}$

Simplify the following radicals. *Remember, no radicals can be left in the denominator.*

**25.)** $\frac{2}{\sqrt{3}}$

**26.)** $\sqrt{32}$

**27.)** $\sqrt{50} \cdot \sqrt{10}$

**28.)** $\sqrt{16} \cdot \sqrt{25}$

**29.)** $\sqrt{\frac{81}{49}}$

**30.)** $\frac{\sqrt{10}}{\sqrt{27}}$

# Ratios and Proportions

**Solve Proportions** If a proportion involves a variable, you can use cross products to solve the proportion. In the proportion $\frac{x}{5} = \frac{10}{13}$, $x$ and 13 are called **extremes.** They are the first and last terms of the proportion. 5 and 10 are called **means.** They are the middle terms of the proportion. In a proportion, the product of the extremes is equal to the product of the means.

| **Means-Extremes Property of Proportions** | For any numbers $a$, $b$, $c$, and $d$, if $\frac{a}{b} = \frac{c}{d}$, then $ad = bc$. |
|---|---|

Example 1:

$$\frac{x}{5} = \frac{10}{13}$$

$$x \cdot 13 = 5 \cdot 10$$

$$13x = 50$$

$$\frac{13x}{13} = \frac{50}{13}$$

$$x = \frac{50}{13}$$

Example 2:

$$\frac{x+1}{4} = \frac{3}{4}$$

$$4(x+1) = 3 \cdot 4$$

$$4x + 4 = 12$$
$$-4 \quad -4$$

$$4x = 8$$

$$\frac{4x}{4} = \frac{8}{4}$$

$$x = 2$$

Solve each proportion.

**31.)** $\frac{x}{21} = \frac{3}{63}$

**32.)** $\frac{-3}{x} = \frac{2}{8}$

**33.)** $\frac{0.1}{2} = \frac{0.5}{x}$

**34.)** $\frac{9}{y+1} = \frac{18}{54}$

**35.)** $\frac{a-8}{12} = \frac{15}{3}$

**36.)** $\frac{3+y}{4} = \frac{-y}{8}$

## Multiplying Polynomials

**FOIL:** To multiply two binomials, find the sum of the products of the:

F – first terms
O – outer terms
I – inner terms
L – last terms

$$(x-2)(x+4)$$

$$(x)(x)+(x)(4)+(2)(x)+(-2)(4)$$

F O I L

$$x^2+4x-2x-8$$

$$x^2+2x-8$$

**Double-Distribution**: Distribute both of the terms in the first parenthesis to the terms in the second parenthesis.

$$(x-2)(x+4)$$

$$x(x+4)-2(x+4)$$

$$x^2+4x-2x-8$$

$$x^2+2x-8$$

Find each product.

**37.)** $(n+8)(n+2)$

**38.)** $(x-3)(x+3)$

**39.)** $(4h+5)(h+7)$

**40.)** $(5m-6)(5m-6)$

## Slope

- The **slope of a line** is the ratio of the change in the y – coordinates to the corresponding change in the x – coordinates.
- Slope = m = $\frac{y_2-y_1}{x_2-x_1}$

**Ex 1:** Given the points (-4,3) and (2,5)

$$m = \frac{5-3}{2-(-4)} = \frac{5-3}{2+4} = \frac{2}{6} = \frac{1}{3}$$

Find the slope of the line given the following points.

**41.)** (1, -3) and (3,5)

**42.)** (8, 11) and (24, -9)

## Factoring

**Factoring** is used to represent quadratic equations in the **factored form** of a(x – p)(x – q) = 0, and solve this equation.

**Factoring GCF**

In a quadratic equation you may factor out the Greatest Common Factor.

**Ex 1:** $16x^2 + 8x = 0$. GCF = 8x

8x(2x + 1) = 0 Zero Product Rule

8x = 0 or 2x +1 = 0

x= 0 or x = -1/2

$$ax^2 + bx + c$$

**Factoring where a = 1**

**Ex 2**: $x^2 + 9x + 20 = 0$ To Factor we want to find two numbers that multiply to 20 and add to 9.

$(x + 5)(x + 4) = 0$ 5 +4 = 9 and 5 *4 = 20

$(x + 5) = 0$ *or* $(x + 4) = 0$ Zero Product Rule

$x = -5$ *or* $x = -4$

Solve each equation.

**43.)** $20x^2 + 15x = 0$

**44.)** $6x^5 + 18x^4 = 0$

**45.)** $x^2 - 16x + 64 = 0$

**46.)** $x^2 - 11x + 30 = 0$

**47.)** $x^2 - 4x - 21 = 0$

**48.)** $x^2 - 6x - 16 = 0$

**Factoring** functions where a > 1 involves a different process. Some will use guess and check. Below is a method that will always work.

$$ax^2 + bx + c$$

| | |
|---|---|
| **Ex 2:** $6x^2 + 13x - 5 = 0$ | Multiply a*c. $6(-5) = -30$ |
| - 2, 15 | Find two numbers that multiply the – 30 and sum to 13 |
| $6x^2 - 2x + 15x - 5 = 0$ | Group the Terms |
| $(6x^2 - 2x) + (15x - 5) = 0$ | Factor GCF |
| $2x(3x - 1) + 5(3x - 1) = 0$ | Use the (3x – 1) and factored terms |
| $(2x + 5)(3x - 1) = 0$ | Zero Product Rule |
| $2x + 5 = 0 \quad or\ 3x - 1 = 0$ | Solve |
| x = $-5/2$ or x = $1/3$ | |

Solve the following by factoring.

**49.)** $15x^2 - 8x + 1 = 0$

**50.)** $3x^2 + 2x - 5 = 0$